Time and Distance

Type 1. formula for Speed = Distance (in unit of length)/Time (in unit of time)

Illustration 1: A car travels a distance of 500 km in 10 hours. What is its speed in km/hr?

Sol: Speed = Distance/Time → 500/10 = 50 km/hr.

Basic Concepts and Theory:

Donald Trump declared that he would build a wall at the Mexican border. Antonio Bandares, when he heard about the Trump wall, planned to go to San Francisco from Mexico City crossing border before the wall is built. He starts at 8 A.M. from Mexico City and wants to reach San Francisco at 10 A.M. He finds out that the total distance to be covered is 100 km and that has to be covered in 2 hours. So in order to cover the distance in 2 hours, he breaks the total distance in two equal parts i.e. 50 km each. So Antonio figured out that he has to cover 50 km every hour, thus his speed would be 50 km per hour. Similarly if he wanted to cover 700 km in 10 hours, he would break the total distance in 10 equal parts i.e. 70 km each. So he needs to cover 70 km every hour which would be his speed.

So Speed is basically how fast someone is moving. It is the distance travelled by a person, body or vehicle in a unit of time.

Fundamental Formulas:

- The most important relationship between these three quantities to be known as formula for distance: **Distance Travelled = Speed X Time**
- Formula for time is **Time = Distance X Speed**
- The speed formula is **Speed = Distance X Time** and

Basic Conversions for Distance Time and Speed

- **Important time and distance Conversions**

  1 km = 1000 m

  1 min = 60 sec

  1 yard = 3 feet

  1 meter = 100 cm

  1 hour = 3600 sec

  1 mile = 5280 feet

  1 hour = 60 min

  1 mile = 1760 yards

- **Speed Calculator : Conversion of speed from km/hr to m/s**

  1 km = 1000 m, 1 hr has 3600 sec. So 1 km/hr = 1000m/3600s = 5/18 m/s.

  To convert the speed from km/hr to m/s, multiply the speed by 5/18.

  To convert the speed from m/s to km/hr, multiply the speed by 18/5.

  e.g. Convert 36 km/hr into m/s → 36 km/hr = 36 × 5/18 = 10 m/s.

  e.g. Convert 20 m/s into km/hr → 20 m/s = 20 × 18/5 =72 km/hr.

Illustration 2: Aman can run a distance of 100 m in 20 seconds. Find the speed of Aman in m/s.

Sol: Speed = Distance/Time → 100/20 = 5 m/s.

Illustration 3: The distance between two stations is 540 km. A train takes 3 hours to cover this distance. Calculate the speed of the train in km/hr and m/s.

Sol: Speed = Distance/Time = 540/3x180 km/hr. To convert speed into m/s we need to multiply 180 by 5/18. So required speed = 180 × 5/18 = 50 m/s.

- **Type 2. Speed and distance formula: Average Speed = Total Distance Travelled/Total Time Taken**

  Illustration 4: Suraj drives first 120 km in 2 hrs and next 180 km in next 4 hrs. What is his average speed for the entire trip in km per hour?

  Sol: Total Distance travelled = 120 + 180 = 300 km. Total Time taken = 2 + 4 = 6 hrs.

  Average Speed =Total Distance Travelled/Total Time Taken = 300/6 = 50 km/hr.

- **Illustration 5:** A train covered first 120 km at a speed of 20 km an hour and then covered the remaining 180 km at a speed of 45 km an hour. Find its average speed.

  Sol: Total distance = 120 + 180 = 300 km. Time taken for the first 120 km = 120/20 → 6 hrs.

  Time taken for the next 180 km = 180/45 → 4 hrs. Total time taken = 6 + 4 = 10 hrs.

  Average Speed =Total Distance Travelled/Total Time Taken = 300/10 = 30 km/hr.

Illustration 6: A cyclist travels at 10 km/hr for 2 hours and then at 13 km/hr for 1 hour. Find his average speed.

Sol: Distance travelled in first 2 hours =10 × 2 = 20 km. Distance travelled in next 1 hour =13 × 1 = 13 km. Total Distance travelled = 20 + 13 = 33 km. Total time taken = 2 + 1 = 3 hrs.

Average Speed =Total Distance Travelled/Total Time Taken =33/3 = 11 km/hr.

- **Type 3. Average Speed: When the time travelled is the same:**The average speed of traveling at two different speeds for the same time span is just the simple average of these two speeds.

- **Illustration 7:** A motorist travels one hour at an average speed of 45 kmph and the next hour at an average speed of 65 kmph. Then what is his average speed?

  Sol: (45 + 65) ÷ 2 = 55 kmph. The total distance traveled by the motorist in these two hours = 65 + 45 = 110 km and he has taken two hours. Therefore, his average speed = 55 kmph.

- **Type 4. Average Speed: When the distance travelled is the same:**

  However, the above simple average rule does not work when the time span of each of the different speeds is different and only the distance is the same. In this case, one should take the simple average of the inverses of the two speeds and then again inverse the speed.

  Illustration 8: On my way from the office to the Pimpri class, I drive at 30 kmph and on the return journey I drive at 45 kmph. What is my average speed of travel?

  Sol: 37.5 kmph is incorrect as the time traveled is different in both the cases and only the distances are same. Let the distance between the office and Pimpri class be x km.

  ∴Time taken on my onward journey = x/30 hours and time taken on my return journey = x/45 .

  ∴The total time taken for my onward and return journey = x/30 + x/45 = 5x/90 hours.

  The total distance traveled both ways = 2x km ∴ Average speed = 2x/(5x/90) = 36 kmph.

- **Type 5. To derive a generalized expression to find the average speed, when the distance is the same:**

  Let the two speeds be a kmph and b kmph. Let the distance traveled

in each of the speeds be x km.

- **Question Types Type 6. Problems on Speed, Time and Distance:** Usually, problems in this subheading cover finding one of the values, when the other two are provided. The important thing to note in such problems is that the units of all three quantities used are the same, i.e. if speed in km/hr, then distance will have to be in km and time in hours.

  Illustration 9: What is the distance covered by a car traveling at a speed of 40 kmph in 15 minutes?

  Sol: 40 x 15/60 = 10 km. The important point to note is that time given was in minutes, whereas the speed was in kmph. Therefore, either speed will have to be expressed as km/min or time will have to be expressed in hours to apply the relationship.

  In this case we converted time into hours to get the answer. Conversely, converting speed into km/min, we get 40 kmph = 40/60 km/min = 2/3 km/min. Therefore, distance traveled = 15 x 2/3 = 10km.

  Illustration 10: Traveling at a speed of 50 kmph, how long is it going to take to travel 60 km?

  Sol: Time = Distance ÷ Speed → 60/50 = 1.2 hours = 1 hour and 12 minutes.

  Note: While converting decimal hours into minutes, these are to be

multiplied with 60 and not by hundred.

- **Illustration 11:** Walking 5/6th of his usual speed, Mike reached his destination 10 minutes late. Find his usual time, and the time taken on this occasion?

  Sol: Let his usual speed be x km/hr and his usual time be t hours. His time on this occasion is 5/6x , The time taken is (t + 10/60) hours. Since the distance travelled on both occasions is the same, xt = 5x/6 x (t + 10/60) .

  Solving for t, we get t = 5/6 hours = 50 minutes, and the time taken on this occasion = 50 + 10 = 60 minutes.

  Illustration 12: If the distance traveled by Mike be 60 km, then what was his usual speed and what was the speed on this occasion?

  Sol: Usual time taken = 50 minutes = 5/6 hours. The distance = 60 km. Usual Speed = Distance ÷ Usual Time → 60/(5/6) = 72 kmph. Speed on this occasion = Distance ÷ Time on this occasion = 60/1 = 60 kmph.

  The ratio between the usual speed to the speed on this occasion = 72/60 = 6/5

  The ratio of the usual time taken to the time taken on this occasion =

50min/60min = 5/6 .

- **Note: In general, speed and time have an inverse relationship.** Therefore, if the speed becomes, say 0.5 times the original speed, then the time taken becomes twice as much as taken originally for the same distance. Or if the ratio of the speed of two moving objects is in the ratio of 3:4, the time taken by them to cover identical distance will be in the ratio of 4:3.

  Relative Speed and Trains: Relative speed is basically defined as the speed of one object with respect to the other.

  Illustration 13: A train traveling at 60 kmph crosses a man in 6 seconds. What is the length of the train?

  Sol: Speed in m/sec = 60 x 5/18 = 50/3 m/sec. Time taken to cross the man = 6 seconds. Therefore, distance traveled = 50/3 x 6 = 100 m = length of the train.

Illustration 14: A train traveling at 60 kmph crosses another train traveling in the same direction at 24 kmph in 30 seconds. What is the combined length of both the trains?

Sol: As both the trains are moving in the same direction, the relative speed of the faster train is 60 – 24 = 36 kmph. The relative speed in m/sec = 36 x 5/18 = 10 m/sec. Time taken = 30 sec.

Therefore, distance traveled = 10 × 30 = 300 m = Combined length of two trains.

- When two objects are moving in the same direction, then their relative speed is the difference between the two speeds.
- When two objects are moving in the opposite direction, then their relative speed is the sum of the two speeds. Problems in this section will involve finding the distance of a train:
    - When it crosses a stationary man / lamp post / sign post / pole - in all these cases the object which the train crosses is stationary - and the distance traveled is the length of the train.

- When it crosses a platform / bridge - in these cases, the object which the train crosses is stationary - and the distance traveled is the length of the train + length of the object.
- When it crosses another train which is moving at a particular speed in the same / opposite direction - in these cases, the other train is also moving and the relative speed between them is taken depending upon the direction of the other train - and the distance is the sum of the lengths of both the trains.
- When it crosses a car / bicycle / a mobile man - in these cases again the relative speed between the train and the object is taken depending upon the direction of the movement of the other object relative to the train - and the distance traveled is the length of the train.

Example 1: Driving 5/4th of his usual speed, David reached the destination 12 minutes earlier. What is the usual time he takes to travel?

Sol: Let X km/hr be the usual speed and let t hours be the usual time taken.

Speed on this occasion = 5/4 X km/hr. The time taken on this occasion = (t - 12/60) hrs.

Since the distance is the same in both the cases, Xt = 5/4 X x (t - 12/60)

Solving for t, t = 1 hour - the usual time taken.

Example 2: In a cross-country race, a motorist averages a speed of 140 mph during the first 4 hours and then increases his average by 20 mph during the last 3 hours. What was his average speed during the entire race?

Sol: Distance traveled in first 4 hours = 140 x 4 = 560 miles.

Distance traveled in next 3 hours = 160 x 3 = 480 miles.

Therefore, the total distance traveled = 1040 miles.

The total time taken = 7 hours. Therefore, the average speed = 1040/7 = 148 4/7mph.

Example 3: During the onward journey from Bombay to Pune, Deccan Queen travels at an average speed of 80 kmph, while on the return journey, the train is able to average a speed of 100 kmph. What is the average speed of the train on its entire journey?

Sol: Average speed = 2ab/a+b = (2x80x100)/180 = 800/9 = 88 8/9km/hr

Example 4: A train traveling at 100 km/hr crosses a bridge of half a km length completely in 30 seconds. What is the length of the train?

Sol: Speed = 100 km/hr = 100 x 5/18 = 250/9 m/sec. Time taken to cross = 30 seconds.

Therefore, distance traveled = 250/9 x 30 = 2500/3 m. Distance = Length of the train + length of the bridge

2500/3 = Length of the train + 500 Length of the train = 1000/3 m

Example 5: A train crosses a signpost in 6 seconds and a car traveling in the same direction at 50 kmph in 72 seconds. What is the length of train and the speed at which it is traveling?

Sol: Case I: Let X km/hr be the speed of the train. = X x 5/18 m/sec

Time taken to cross a signpost = 6 seconds.

Therefore distance traveled = X x 5/18 x 6 = 5X/3 meter = length of the train

Case II:

The speed of the car = 50 km/hr.

Relative speed of the train w.r.t car = (X – 50) km/hr = (X – 50) x 5/18 m/sec.

Time taken to cross the car = 72 seconds. Therefore, distance traveled = (X – 50) x 5/18 x 72 = 20 (X-50) m = length of train

Equating length of the train in Case I and Case II, we get 5X/3 = 20 (X – 50).

Solving for X, we get X = 600/11 km/hr and the length = 5/3 x 600/11 = 1000/11m

Example 6: An LSS bus and an ordinary bus leave Pune for Chinchwad - a distance of 32 km simultaneously. The ratio between the average speed of the LSS bus and that of the ordinary bus is 3:2. The LSS bus reaches Chinchwad and immediately leaves back for Pune and meets the ordinary bus at Pimpri. What is the distance between Chinchwad and Pimpri?

Sol: Speed of LSS : Speed of ordinary :: 3 : 2.

Since, Distance Speed, Distance traveled by LSS : Distance traveled by ordinary :: 3 : 2

Let distance between Chinchwad and Pimpri be x km.

Then distance traveled by LSS = 32 + x, while the distance traveled by ordinary bus = 32 – x. Therefore, 32 + x : 32 – x :: 3 : 2. Solving for x, we get x = 6.4 km = distance between Pimpri and Chinchwad.

Example 7: Traveling at 6 km/hr, I reach my office 20 minutes late. Traveling at 8 km/hr I reach my office 30 minutes early. What is my usual speed and time taken to reach my office?

Sol: Let my usual speed be S km/hr and my usual time be t hours.

Therefore, $6 \times \left(t + \frac{20}{60}\right) = 8 \times \left(t - \frac{30}{60}\right)$

Solving for t, we get t = 3 hours.

Since the usual time taken = 3 hours, usual distance traveled = 3S kms,

Equating distance traveled usually, with distance traveled at any of the other two speeds, we get 6 x (3 + 20/60) = 3S. Therefore, S = 6 2/3 km/hr.

Example 8: Raju hikes up a hill at 4 mph and comes down at 6 mph. If the total time taken for the total journey is 3.5 hours, what was the distance between the hilltop and the foothills?

Sol: Average speed = 2ab/a+b = (2x6x4)/10 = 4.8 mph. Time taken = 3.5 hours both ways. So, the two way distance = 4.8 x 3.5 miles = 16.8 miles. Hence, the distance one-way = 8.4 miles.

Example 9: Indrayani leaves Pune for Bombay at 17:30 hours and reaches Bombay at 21:30 hours, while Shatabdi, which leaves Bombay at 17:00 hours, reaches Pune at 20:30 hours. At what time do they pass each other?

Sol: Let the distance between Bombay and Pune = d km.

Indrayani Speed = d/4 km/hr and that of Shatabdi = d/35 km/hr.

Let t be the time in hrs after Shatabdi has left for Pune, when the two trains meet.

Therefore, distance traveled by Shatabdi = d/3.5 x t

And that of Indrayani = d/4 x (t - 30/60) The sum of the distances traveled by the two trains

= distance between Bombay and Pune = d km. Therefore,

$$\frac{d}{3.5} \times t + \frac{d}{4} = \frac{d}{4} \times \left(t - \frac{30}{60}\right)$$ = d.

Solving for t, we get t = 2.1 hours = 2 hrs 6 min. Hence, the two trains meet at 7:06

Q.1. What is the distance between Alankar's house and office, if he will reach office late by 20 minutes, traveling at 10 km/hr and will reach early by 15 minutes, traveling at 15 km/hr?

a) 14.5 km

b) 17.5 km

c) 16.5 km

d) 15 km

Answer & Explanation

Sol : Option B

Explanation: : Difference in timing = 15 – (–20) = 35 min. Let required distance = x.

∴ x/10 - x15 = 35/60 → x = 17.5 km.

Q.2. What is the average speed if a man drives 3 hours at 60 km/hr and the next 6 hours at 50 km/hr.?

a) 55 km/hr

b) 52.5 km/hr

c) 53.33 km/hr

d) 56.67 km/hr

Answer & Explanation

Sol : Option C Explanation: Average speed =

Total distance/Total time → [(3x60)+(6x50)]/(3+6) = 480/9

=53.33 km/hr

Q.3. A train without stoppages travels at the rate of 50 km per hour and with stoppages travels at the rate of 45 km an hour. How many minutes does the train stop on an average per hour?

a) 6 min

b) 10 min

c) 5 min

d) 8 min

Answer & Explanation

Sol : Option A

Explanation: Minutes/hr the train stops = (50 -45)/50 x 60 = 5/60 x 60 → 6 min.

Q.4. Two cyclists do the same journey by travelling at 9 km/hr and 10 km/hr respectively. Find the distance travelled when one takes 32 minutes longer than the other.

a) 44 km

b) 48 km

c) 50 km

d) 46 km

Answer & Explanation

Sol : Option B

Explanation: Let the distance traveled = x. ∴ x / 9 – x / 10 = 32 / 60 → x = 48 km.

Q.5. Joseph walked 1 km/hr slower than usual and he could return home in 9/8th of his usual time. His normal walking rate is

a) 8 km/hr

b) 9 km/hr

c) 10 km/hr

d) 11 km/hr

Answer & Explanation

Sol : Option B

Explanation: Let his normal speed = x km/hr. Decreased speed = (x – 1) km/hr.

If usual time is t hrs, then on decreasing speed, he takes 9 / 8 of his usual time. But distance traveled on both sides is same. ∴ 9/8(x-1)t = tx → x = 9 km/hr.

Q.6.A man walks a km in b hours. The time taken to walk 200 m is

a) ab/200 hours

b) 200b/a hours

c) b/5a hours

d) a/5b hours

Answer & Explanation

Sol : Option C

Explanation: Speed of man = a/b km/hr. Distance to be traveled = 200 m = 0.2 km.

∴ Time taken = (0.2)/(a/b) → 0.2b / a→b/5a hours.

Q7.A car during its journey travels 30 minutes at a speed of 40 km/hr, another 45 minutes at a speed of 60 km/hr and 2 hours at a speed of 70 km/hr. Find its average speed (approximately).

a) 50 km/hr

b) 63 km/hr

c) 55.5 km/hr

d) 48 km/hr

Answer & Explanation

Sol : Option B

Explanation: Average speed = (Total distance)/(Total Time) →

$$= \frac{\left(\frac{1}{2} \times 40\right) + \left(\frac{3}{4} \times 60\right) + (2 \times 70)}{\frac{1}{2} + \frac{3}{4} + 2}$$

= (20+45+140)/(13/4)

= 63 km/hr.

Q8. Find the time taken to cover the distance from Delhi to Agra, a distance of 360 km, by the Shatabdi express moving at 20 m/s.

a) 3 hours

b) 4 hours

c) 5 hours

d) 6 hours.

Answer & Explanation

Sol : Option C

Explanation: Moving at 20 m/s = 20 × (18/5) km/h= 72km/h. Time = 360 /72 = 5 hours.

Q9. Walking at 5/7th of his usual speed, Kapil reaches the college 6 min late. Find Kapil's usual time to reach college. A. B. C. D. B.

a) 15 min

b) 10 min

c) 5 min

d) 8 min

Answer & Explanation

Sol : Option A

Explanation: Let usual speed be x. Earlier time was d /x.

Now the time would be d / (5/7 x).

The difference between the two is 0.1 hour.

So the equation is (d / x) (7/5 – 1) = 0.1.

So usual time = d/x = 0.1× 5 / 2 = 0.25 hours = 15 minutes

Q10. Ram flew to Lanka in his Pushpak Vahan, at an average speed of 600 km/hr. On his way back along with Sita, because of the heavier baggage

that he was carrying, his speed reduced to 400 km/hr. Find the average speed during the journey.

a) 520 km/hr

b) 440 km/hr

c) 480 km/hr

d) 560 km/hr

Answer & Explanation

Sol : Option C

Explanation: During the journey, Average Speed = 2 × 400 × 600 / (400 + 600)= 480 km /hr.

Q.11. A students walks from his house at 5/2 km/h and reaches his school late by 6 min. Next day, he increase his speed by 1 km/h and

reaches 6 min before school time. How far is the school from his house?

(A) 5/4 km

(B) 7/4 km

(C) 9/4 km

(D) 11/4 km

Answer

Ans . B

Solution

Let the required distance = X

Given, initial speed, a = 5/2.

And new speed, b= (5/2)+1 = 7/2.

Difference between two the times

= 6+6=12 min

According to the question,

X/(5/2) – X/(7/2) = 12/60→ 2X/5 – 2X/7 = 1/5

→14X-10X= 7 → X=7/4 km

Q.12. A thief is a spotted by a policeman from a distance of 200 m. When the policeman starts chasing, the thief also starts running. If

the speed of the thief be 16 km/h and that of the policeman be 20 km/h, how far the thief will have run before he is overtaken?

(A) 800 m

(B) 850 m

(C) 700 m

(D) 650 m

Answer

Ans . A

Solution

Here, d = 200 m, a= 16 km/h

= 16×(5/18) = 40/9 m/s.

And b = 20 km/h = 20×(5/18) = 50/9 m/s

Required distance = d×{a/(b-a)}

$$= 200 \times \frac{\frac{40}{9}}{\frac{50}{9} - \frac{40}{9}}$$

= 200×(40/10)=800m.

Q.13. A certain distance is covered at a certain speed. If half of this distance is covered in 4 times of the time, find the ratio of the two speed.

(A) 1:8

(B) 1:4

(C) 4:1

(D) 8:1

Answer

Ans . D

Solution

Let x Km be covered in y h.

Then, First Speed = X/Y km/h

Again, X/2 km be covered in 4Y h.

New speed = (X/2)×(1/4Y)= X/8Y km/h

Hence, required ratio of speeds

= X/Y : X/8Y = 1: 1/8 = 8:1

Q.14. Sunil drives a motorcycle and covers a distance of 715 km at covered in 4 times of the time, find the ratio of the two speed.

(A) 65 km/h

(B) 55 km/h

(C) 60 km/h

(D) 36 km/h

Answer

Ans . B

Solution

$\frac{715}{x} - \frac{715}{x+10} = 2$

$\rightarrow \frac{715}{x} - \frac{715}{x+10} = 2$

$\rightarrow \frac{x+10-x}{x(x+10)} = \frac{2}{715}$

$\rightarrow$ x2+10= $\frac{10 \times 715}{2} = 3575$

$\rightarrow$ x2+65x – 55x – 3575 = 0

$\rightarrow$ x (x – 55) (x+65) = 0

→ (x – 55)(x+65) = 0

→ x = 55 or x = - 65

Ignoring the negative value, we get X = 55

 Original speed of the motorcycle = 55 km

Q.15. Amit walks at a uniform speed of 4 km/h and 4 h after his starts, Brijesh cycles after him at the uniform rate of 20 km/h. How far from the starting point will Brijesh catch Amit?

(A) 15 km

(B) 18 km

(C) 13 km

(D) 20 km

Answer

Ans . D

Solution

Let British catches Amit after x h. Then, distance travelled by Amit in (X+4)h.

= Distance travelled by Brijesh in X h.

According to the question,

$4(x+4) = 20x$

$\rightarrow (4x+16) = 20x$

$\rightarrow 16x = 16$

$\rightarrow x = 16/16 = 1$

 Distance travelled by Brijiesh in 1 h = 1 × 20 = 20 km

Q.16. A train leaves Manipur at 6 am and reaches Dispur at 10 am. Another train leaves Dispur at 8 am and reaches Manipur at 11:30 am. At what time do the two trains cross each other?

(A) 7 : 56 am

(B) 7 : 56 pm

(C) 8 : 56 am

(D) 8 : 56 pm

Answer

Ans . C

Solution

Let distance between Manipur and Dispur = x km

Average speed of train from Manipur = x/4 km/h

Let, they meet y h after 6 am.

Then, according to the question,

$(\frac{x}{y} \times y) + \frac{2x}{7} \times (y-2) = x$

→ (y/4)+2(y-2)/7=1

→ 7y+8(y-2)=28

→15y=44

→ y=(44/15)h= 2h 56 min

Clearly, trains meet 2 h 56 min after 6 am.

Hence, the train meet at 8 : 56 am.

Q.17. The distance between two stations X and Y is 450 km. A train L starts at 6 pm from X and Y is at average speed of 60 km/h. Another train M starts from Y at an average speed of 60 km/h. Another train M starts from Y at 5: 2 pm and moves towards x at an average speed of 80 km/h. How far from X will the two trains meet and at what time?

(A) 170 km, 8 : 50 pm

(B) 150 km, 7 : 50 pm

(C) 170 km, 6 : 50 pm

(D) 150 m, 9 : 50 pm

Answer

Ans . A

Solution

Let two trains meet at a km from x.

Then, (Time taken by M to cover

(450 – a) km) – (Time taken by L to cover a km) = 40/60.

→ (450-a)/80 – a/60 = 40/60.

→ (450-a)/80 = 40/60+a/60.

→ (450-a)/8 – (40+a)/6 = 0

→ 3(450-a) – 4(a+40)=0

→ 7a= 1190

→ a = 1190/7 = 170

 Time taken by L to cover 170 km = (170/60) h = 2 h 50 min.

Q.18. Two friends X and Y walk from A to B at distance of 39 km, at 3 km an hour and $\frac{(120+72)}{120-72} \times 50$ km an hour respectively Y reaches B, returns immediately and meet X at C. Find the distance from A to C.

(A) 26 s

(B) 25 s

(C) 15 s

(D) 27 s

Answer

Ans . A

Solution

Ans . Relative speed = (84+60) km/h

= 144 km/h

= 144×(5/18)m/s

= 8×5 = 40 m/s

Distance covered in passing each other = (512+528) m

= 1040 m

 Required time = 1040/40 = 26s.

Q.29. A train passes two persons who are walking in the direction opposite to the direction of train at the rate of 10 m/s and 20 m/s respectively in 12s and 10s respectively. Find the length of the train.

(A) 500 m

(B) 900 m

(C) 400 m

(D) 600 m

Answer

Ans . D

Solution

Given, T1 = 12s, T2 = 10s,

a = 10 m/s and b = 20 m/s

Now, length of the train

= Difference in speeds × T1 × T2/ T1- T2

= (20-10)×12×10/12-10

= (10×12×10)/2

= 600 m.

Q.30. From stations M and N, two trains start moving towards each other at speed 125 km/h and 75 km/h respectively. When the two trains meet each

(A) 190 km

(B) 200 km

(C) 145 km

(D) 225 km

Answer

Ans . B

Solution

Given, a = 125 km/h, b = 75 km/h d = 50 km

Now, distance between the stations M and N

$= \left(\frac{a+b}{a-b}\right) \times d$

$= \left(\frac{125+75}{125-75}\right) \times 50$

= (200/50)×50 = 200 km.